GAU 2817

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT	:	SIMON J. BROADLEY
SERIAL NO.	:	09/478,578
FILED	:	January 6, 2000
FOR:	:	SELF-OSCILLATING VARIABLE FREQUENCY CLOSED LOOP CLASS D AMPLIFIER

Ex. K. Nguyen

Group 2817

AMENDMENT AND REQUEST FOR RECONSIDERATION

Hon. Commissioner of
Patents and Trademarks,
Washington, D.C. 20231

Dear Sir:

This is in response to the Office Action of December 14, 2000, in the above-identified application.

Kindly amend the application as follows.

I hereby certify that this correspondence is being deposited with the United States Postal Service as CERTIFIED MAIL NO. 7099 3220 0003 2849 6147 in an envelope addressed to: HON. COMMISSIONER OF PATENTS AND TRADEMARKS, Washington, D.C. 20231 on May 14, 2001

TOD R. NISSLE, Reg. No. 29,241 — May 14, 2001 DATE

IN THE SPECIFICATION

On page 10, line 15, insert a period after "19".

IN THE CLAIMS

Amend Claim 1. Insert new Claims 2 and 3.

The foregoing amendments are reflected in the attached ***APPENDIX I: Replacements, Deletions, Additions*** and ***APPENDIX II: Marked up Versions***.

REQUEST FOR RECONSIDERATION

The Examiner's thoughtful attention to this application is sincerely appreciated.

Reconsideration of the rejections set forth in the Office Action of December 14, 2000, is respectfully requested in view of the foregoing amendments and following remarks.

The Invention

Applicant provides a class D amplifier which:

1. Is self-oscillating:

*"This automatic '**self-oscillating**' or 'hunting' pattern eventually typically results in there only being a small error between the actual gain in the signal leaving filter 19." Specification, p. 10, lines 13 to 15.*

2. Utilizes a zero offset detector to receive a PWM waveform and to turn switches on and off:

*"The ADJ OUT control signal 17 is a step response **PWM** waveform. The signal ADJ OUT control 17 is received by zero crossing detector 15 ... The zero crossing detector 15 also separates out positive and negative signals and determines whether the high side MOSFET switch M1 is turned on or whether the low side MOST swtich MS is turned on." Specification, p. 5, lines 5-7 and 9 to 11.*

3. Slows down when the magnitude of the error in gain increases:

*"As the magnitude of the error between the desired gain produced by the amplifier of the invention increases, operation of the amplifier circuit **slows**." Specification, p. 12, lines 1 to 3.*

The Prior Art

The Nguyen et al. reference (U.S. 5,949,282) utilizes a PWM instead of the zero crossing detector utilized in the amplifier of the invention. In the Nguyen et al. reference, the PWM produces a PWM waveform. In Applicant's invention, the error amplifier circuit 14 produces a PWM waveform:

> *"The ADJ OUT control signal 17 is a step response PWM waveform. The signal ADJ OUT control 17 is received by zero crossing detector 15 ... " Specification, p. 5, lines 5-7.*

If a PWM were substituted for the zero crossing detector 15 used in the amplifier of the invention, a key purpose of the invention would be defeated. The zero crossing detector 15 in Applicant's invention facilitates the variable frequency of the amplifier of the invention. Conventional PWM's have a fixed frequency.

The Rodriguez reference (U.S. 5,986,498) also utilizes a PWM.

The Cini reference (U.S. 4,673,889) does not appear to use the closed loop approach of the amplifier of the invention. Instead, the Cini reference uses an open loop feedback from the switching waveform rather than from the filtered waveform at the speaker. Also, the feedback in the Cini reference functions as an integrator rather than as the difference comparator used in Applicant's invention.

Accordingly, Applicant respectfully submits that the references of record do not anticipate the invention (as set forth in the amended Claims) under 35 U.S.C. Section 102 or render the invention obvious under 35 U.S.C. Section 103.

The Claims

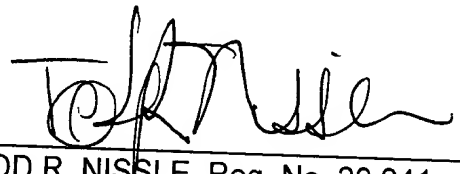
Claim 1 has been amended to note that the error amplifier circuit 14 (Fig. 1) produces a **PVM** waveform control signal. This amendment is made to emphasize that the zero crossing detector does not produce a PVM signal in the manner of the Nguyen reference and instead functions to activate switches as set forth in section (a) of the Claim.

Claim 2 notes that the error amplifier circuit 14 produces a **PVM** waveform control signal and notes that the operation of the amplifier **slows** as the magnitude of the error in gain increases.

Claim 3 notes that the error amplifier circuit 14 produces a **PVM** waveform control signal, notes that the operation of the amplifier **slows** as the magnitude of the error in gain increases, and notes that the detector 15 is a **variable frequency** zero crossing detector.

If the Examiner finds merit in the foregoing remarks and amendments, it is believed the application is in condition for allowance, and such action is earnestly solicited.

Respectfully submitted,



TOD R. NISSLE, Reg. No. 29,241
TOD R. NISSLE, P.C.
P. O. Box 55630
Phoenix, Arizona 85078
Tel: 602-494-8700
Fax: 602-494-8707
E-mail: *nissle@nissle.com*

Attorney's Docket No. 995-P-3

APPENDIX I: Replacements, Deletions, Additions

REPLACEMENTS

I. Title: None.

II. Specification: None.

III. Claims:

1. A self oscillating audio Class D amplifier, comprising

(a) a detector for receiving a PVM waveform control signal and producing a digital waveform switching signal to activate one of a pair including a positive switch and a negative switch to correct gain produced by the Class D amplifier;

(b) an output stage including a positive switch and a negative switch, said output stage receiving said switching signal and activating one of said switches to produce a digital driving signal;

(c) an output filter to receive said digital driving signal, remove switching noise and provide an amplified audio analog output signal to drive a load;

(d) an error amplifier circuit to

(i) receive said amplified analog output signal and compare said output signal to said input signal for gain-correction purposes, and

(ii) produce said PVM waveform control signal.

IV. Abstract: None.

DELETIONS

I. Title: None.

II. Specification: None.

III. Claims

Delete Claims 5, 17 to 51.

IV. Abstract: None.

ADDITIONS

I. Title: None.

II. Specification:

On page 10, lines 15, add a period after "19".

III. Claims

Add new Claims 2 and 3.

2. A self oscillating audio Class D amplifier, comprising

(a) a detector for receiving a PVM waveform control signal and producing a digital waveform switching signal to activate one of a pair including a positive switch and a negative switch to correct gain produced by the Class D amplifier;

(b) an output stage including a positive switch and a negative switch, said output stage receiving said switching signal and activating one of said switches to produce a digital driving signal;

(c) an output filter to receive said digital driving signal, remove switching noise and provide an amplified audio analog output signal to drive a load;

(d) an error amplifier circuit to

(i) receive said amplified analog output signal and compare said output

signal to said input signal for gain-correction purposes, and

(ii) produce said PVM waveform control signal;

the operation of said amplifier slowing as the magnitude of the error in gain increases.

3. A self oscillating audio Class D amplifier, comprising

(a) a variable frequency zero crossing detector for receiving a PVM waveform control signal and producing a digital waveform switching signal to activate one of a pair including a positive switch and a negative switch to correct gain produced by the Class D amplifier;

(b) an output stage including a positive switch and a negative switch, said output stage receiving said switching signal and activating one of said switches to produce a digital driving signal;

(c) an output filter to receive said digital driving signal, remove switching noise and provide an amplified audio analog output signal to drive a load;

(d) an error amplifier circuit to

(i) receive said amplified analog output signal and compare said output signal to said input signal for gain-correction purposes, and

(ii) produce said PVM waveform control signal;

the operation of said amplifier slowing as the magnitude of the error in gain increases.

IV. Abstract: None.

APPENDIX II: Marked Up Versions

Marked Up Versions

I. Title: None.

II. Specification: None.

III. Claims:

1. A self oscillating audio Class D amplifier, comprising

(a) a detector for receiving a PVM waveform control signal and producing a digital waveform switching signal to activate one of a pair including a positive switch and a negative switch to correct gain produced by the Class D amplifier;

(b) an output stage including a positive switch and a negative switch, said output stage receiving said switching signal and activating one of said switches to produce a digital driving signal;

(c) an output filter to receive said digital driving signal, remove switching noise and provide an amplified audio analog output signal to drive a load;

(d) an error amplifier circuit to

(i) receive said amplified analog output signal and compare said output signal to said input signal for gain-correction purposes, and

(ii) produce said PVM waveform control signal.

IV. Abstract: None.